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(54) DATA TRANSFER DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a data transfer device that eliminates the need for re- acquisition processing of a terminal address and eliminates the need for rewrite processing of a routing table of a router and can quickly conduct connection processing.

SOLUTION: The data transfer device is provided with a master conversion means that manages one IP address or more and converts a sender IP address of a connected terminal into the managed address as above, a notice means that informs other data transfer device about conversion information denoting the converted address by the master conversion means, a conversion information reception means that receives the conversion information of which the other data transfer device informs, a slave conversion means that converts an address of data with the address described in the conversion information received by the conversion information reception means according to the conversion information, and a transfer means data via the master and slave conversion means.
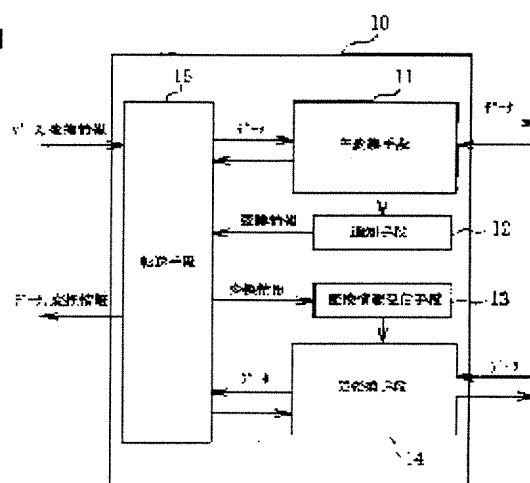
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terminal 5 linked to the transmitting agency terminal 1 in the management subnet of a router 2 moves to the location of the destination terminal 6 in the management subnet of a router 4 from the inside of the management subnet of a router 3, IP tunneling 7 is carried out between a router 3 and a router 4. In that case, since information is encapsulated and is transmitted to a router 4 once it reaches a router 3, useless data will be transmitted both ways between a router 2 and a router 3, therefore it presses a band, and has the problem of leading to the fall of the communication band shared with other equipments. Moreover, a limit of the maximum length of the packet on a network may be exceeded by huge-ization of the packet by IP capsulation. In that case, although fragmentation-ized processing which divides into a termination or two or more packets of a packet transfer, and shortens a packet size is performed, there is also a problem that the load of a router increases by this processing.

[0006]
[Problem(s) to be Solved by the Invention] In view of an above-mentioned trouble, the purpose of this invention makes re-acquisition processing of the terminal address unnecessary, makes rewriting processing of the routing table of a router unnecessary, and is to offer the data transfer unit which can perform connection processing quickly.

[0007]
[Means for Solving the Problem] In order that the data transfer unit of this invention may attain the above-mentioned purpose, 1 or two or more IP addresses are managed. A main conversion means to change the transmitting agency IP address of the terminal to connect into said address to manage, A notice means to notify the conversion information which changed the address with the main conversion means to other data transfer units, A conversion information receiving means to receive the conversion information notified from other data transfer units, It is characterized by having a transfer means to transmit the data which went via a ****** means to change the address of the data which have the address indicated by the conversion information which the conversion information receiving means received according to conversion information, the main conversion means, and the ****** means.

[0008] In order to perform address translation which cooperated between data transfer units according to this invention, re-acquisition processing of the terminal address and rewriting processing of the routing table of a router become unnecessary.

[0009]
[Embodiment of the Invention] Next, the example of this invention is explained.

[0010] The [1st example] Drawing 2 is drawing showing the configuration of the 1st example of the data transfer unit by this invention. In this example a data transfer unit 10 1 or two or more IP addresses are managed. With the main conversion means 11 and the main conversion means 11 of changing into the address which manages the transmitting agency IP address of the terminal to connect Other data transfer units are received in the conversion information which changed the address. a notice means 12 to notify, a conversion information receiving means 13 to receive the conversion information notified from other data transfer units, and a ****** means 14 to change the address of the data which have the address indicated by the conversion information which the conversion information receiving means 13 received according to conversion information — and It has a transfer means 15 to transmit the data which went via the main conversion means 11 and the ****** means 14.

[0011] Next, actuation of the 1st example is explained using drawing 3 and 4. Here, it is each data transfer unit 101, 102, and 103. IP address 1.1.1.X which can be given to the terminal in self-transfer within the limits, respectively, 1.1.2.X, and 1.1.3.X It manages and is each data transfer unit 101, 102, and 103. Routing table shall already be built by the router network 20 to connect so that the data of the address which a certain specific data transfer unit manages may be transmitted to the specific data transfer unit. X — 0 to 255 up to — any value shall be expressed That is, the subnet of a data transfer unit is taken as a 24-bit mask. Destination terminal 112 Address 1.1.2.1 Data transfer unit 102 It has connected and is a data transfer unit 102. The address 1.1.2.100 to manage It shall be given. here — destination terminal 112 it is shown in drawing 4 — as — data transfer unit 102 Transfer range 122 from — the address 1.1.3.1 Data transfer unit 103 Transfer range 123 It shall move.

* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1] A main conversion means to manage 1 or two or more IP addresses, and to change the
transmitting agency IP address of the terminal to connect into said address to manage, A notice
means to notify the conversion information which changed the address with this main conversion
means to other data transfer units, A conversion information receiving means to receive the
conversion information notified from other data transfer units, The data transfer unit
characterized by having a transfer means to transmit the data which went via a ****** means to
change the address of the data which have the address indicated by the conversion information
which this conversion information receiving means received according to said conversion
information, said main conversion means, and the ****** means.

[Translation done.]

[0017] Moreover, the terminal other than the address which the ****** means indicated to the conversion information which the main conversion means shows concretely may change into the address addressed to the destination terminal the address of the data which make the terminal the destination by the multicast address in the case of belonging to the multicast group, or the broadcast address related to a terminal. Moreover, in connection with address translation, the re-calculation of the header checksum of IP header, TCP, and an UDP false header or the re-calculation of the TCP sequence number in FTP (file transfer protocol) may be performed.

[0018] As mentioned above, the processing which makes unnecessary routing-table rewriting processing of the router which exists in address re-acquisition processing of a terminal or a transfer path, and is require of a network and a terminal mitigates, quick processing enables, and degradation of the overload of the router accompanying frequent path modification and the communication link quality by root damping, the blocking of a communication link, etc. protect, without cause huge-ization of a packet by cooperate between data transfer units and perform address translation in this example.

[0019] [the 2nd example] — the condition of having started the communication link in the 1st example of the above — destination terminal 112 the address — data transfer unit 102 from — although given — this example — destination terminal 112 It shall have the address of a proper. In this example, the following procedures perform processing between data transfer units. At an initial state, it is the destination terminal 112. It is the address 192.1.1.100 It carries out.

(1) Data transfer unit 102 Destination terminal 112 Connection is recognized.

(2) It is the destination terminal 112, without rewriting the routing table of the router network 20. In order to receive the data of addressing, it is a data transfer unit 102. Destination terminal 112 192.1.1.100 which is the address 1.1.2.100 which is the address with which self manages and data are transmitted to self-addressed Address translation is carried out and data communication is started. The following procedures are the same as the 1st example of the above.

[0020] As mentioned above, in this example, when the terminal has the address of a proper, a terminal can communicate, without being dependent on the address of the transfer equipment to connect with the address of a proper.

[0021] The [3rd example] Although the transmitting agency terminal communicated in the 2nd example of the above, without getting to know the true address of a destination terminal, in this example, a transmitting agency terminal can recognize the address of the proper of a destination terminal. In this example, the following procedures perform processing between data transfer units. At an initial state, it is the destination terminal 112. It is the address 192.1.1.100 It carries out.

(1) Data transfer unit 102 Destination terminal 112 Connection is recognized.

(2) without it rewrites the routing table of the router network 20 — destination terminal 112 the data of addressing — data transfer unit 102 in order to mind and receive — data transfer unit 102 Destination terminal 112 the address of the data of addressing — 192.1.1.100 from — 1.1.2.100 Address translation is carried out.

(3) Data transfer unit 102 Data transfer unit 101 It receives and is the address 1.1.2.100. The data of addressing are the address 192.1.1.100. It notifies that it is data of addressing and is the transmitting agency terminal 111. Address 192.1.1.100 It is the address 1.1.2.100 about the data of addressing. Address translation is required as becoming addressing and data communication is started. The following procedures are the same as the 2nd example of the above.

[0022] As mentioned above, in this example, a terminal can communicate between terminals with the address of a proper, without depending to the address of the data transfer unit connected with the address of a proper.

[0023]
[Effect of the Invention] As explained above, even if the data transfer unit to connect changes according to the data transfer unit of this invention, by cooperating between data transfer units and performing address translation, routing table rewriting processing of all the routers belonging to the router or router network with which address re-acquisition processing of a terminal or a transfer path exists is made unnecessary, the processing required of a data transfer network and a terminal is mitigated, and quick processing is enabled.

* NOTICES *

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the data transfer unit linked to a router network,
in order to transmit the data of the data transfer unit which transmits data, especially the mobile
terminal which has IP (Internet Protocol) address.
[0002]
[Description of the Prior Art] There are the following three methods as actuation at the time of
IP terminal moving to the zone of the management subnet which other routers manage from the
zone of the management subnet which one router manages, or an access point, or other access
points conventionally.
[0003] The first method is a method which a terminal connects and in which it has an IP address
according to individual for every router. By this method, in case a terminal newly connects with a
router, it is necessary to acquire a corresponding IP address again. the fall of the throughput of
the router which is in the router which publishes an IP address to IP terminal in IP terminal list,
and an intermediate path in order to require the processing time complicated [the procedure of
this IP address re-acquisition], and long -- being generated -- the zone of one more zone to
others -- or communicative blocking may be produced from the management subnet of one
router temporarily because of the re-connection processing at the time of performing a
handover to the subnet of other routers. Moreover, when passing speed is quick and the pocket
IP terminal of a broadband appears, a more frequent handover will be performed by the migration
between frequent zones, or migration between the management subnets of a router, and it is
expected that the re-acquisition processing for it serves as a neck of the communication link
between IP terminals.
[0004] The second method is a method with which all the routers with which IP terminal belongs
to all the routers or router networks which continue holding the IP address of a proper and are
located in the transfer path between terminals with connection modification rewrite the routing
table used in order to transmit data. Also in this method, since the frequency of table rewriting is
the order of a part, it usually has the problem of becoming what cannot disregard time amount
after hand-over is carried out by rewriting until a communication link is resumed. Furthermore,
when the frequency of table rewriting is excessive, the communication blackout by the root
damping which carries out fixed time amount control of the fall of the router processing speed by
the router overload or the rewriting may break out.
[0005] The third method is a method which uses IP tunneling. IP tunneling is Internet Engineering
Task Force. It is the approach of adding predetermined IP header to the original IP packet, and
encapsulating the original IP packet as data division of a new IP packet as indicated by Request
For Comments (IETF RFC)2003. When using IP tunneling, in case data are transmitted to the
router of the migration place of IP terminal from the home router with which IP terminal belongs
an IP packet, IP header which indicated the address for transmitting to the router which
connects newly is added to the outside of the original IP packet. By this method, in this way,
since IP header will be further attached to the outside of an IP packet, there is a problem that
the band of that part is spent vainly. Moreover, as shown in drawing 1 , when the destination

terminal 5 linked to the transmitting agency terminal 1 in the management subnet of a router 2 moves to the location of the destination terminal 6 in the management subnet of a router 4 from the inside of the management subnet of a router 3, IP tunneling 7 is carried out between a router 3 and a router 4. In that case, since information is encapsulated and is transmitted to a router 4 once it reaches a router 3, useless data will be transmitted both ways between a router 2 and a router 3, therefore it presses a band, and has the problem of leading to the fall of the communication band shared with other equipments. Moreover, a limit of the maximum length of the packet on a network may be exceeded by huge-ization of the packet by IP capsulation. In that case, although fragmentation-ized processing which divides into a termination or two or more packets of a packet transfer, and shortens a packet size is performed, there is also a problem that the load of a router increases by this processing.

[0006]

[Problem(s) to be Solved by the Invention] In view of an above-mentioned trouble, the purpose of this invention makes re-acquisition processing of the terminal address unnecessary, makes rewriting processing of the routing table of a router unnecessary, and is to offer the data transfer unit which can perform connection processing quickly.

[0007]

[Means for Solving the Problem] In order that the data transfer unit of this invention may attain the above-mentioned purpose, 1 or two or more IP addresses are managed. A main conversion means to change the transmitting agency IP address of the terminal to connect into said address to manage, A notice means to notify the conversion information which changed the address with the main conversion means to other data transfer units, A conversion information receiving means to receive the conversion information notified from other data transfer units, It is characterized by having a transfer means to transmit the data which went via a ****** means to change the address of the data which have the address indicated by the conversion information which the conversion information receiving means received according to conversion information, the main conversion means, and the ****** means.

[0008] In order to perform address translation which cooperated between data transfer units according to this invention, re-acquisition processing of the terminal address and rewriting processing of the routing table of a router become unnecessary.

[0009]

[Embodiment of the Invention] Next, the example of this invention is explained.

[0010] The [1st example] Drawing 2 is drawing showing the configuration of the 1st example of the data transfer unit by this invention. In this example a data transfer unit 10 1 or two or more IP addresses are managed. With the main conversion means 11 and the main conversion means 11 of changing into the address which manages the transmitting agency IP address of the terminal to connect Other data transfer units are received in the conversion information which changed the address. a notice means 12 to notify, a conversion information receiving means 13 to receive the conversion information notified from other data transfer units, and a ****** means 14 to change the address of the data which have the address indicated by the conversion information which the conversion information receiving means 13 received according to conversion information -- and It has a transfer means 15 to transmit the data which went via the main conversion means 11 and the ****** means 14.

[0011] Next, actuation of the 1st example is explained using drawing 3 and 4. Here, it is each data transfer unit 101, 102, and 103. IP address 1.1.1.X which can be given to the terminal in self-transfer within the limits, respectively, 1.1.2.X, and 1.1.3.X It manages and is each data transfer unit 101, 102, and 103. Routing table shall already be built by the router network 20 to connect so that the data of the address which a certain specific data transfer unit manages may be transmitted to the specific data transfer unit. X -- 0 to 255 up to -- any value shall be expressed That is, the subnet of a data transfer unit is taken as a 24-bit mask. Destination terminal 112 Address 1.1.2.1 Data transfer unit 102 It has connected and is a data transfer unit 102. The address 1.1.2.100 to manage It shall be given. here -- destination terminal 112 it is shown in drawing 4 -- as -- data transfer unit 102 Transfer range 122 from -- the address 1.1.3.1 Data transfer unit 103 Transfer range 123 It shall move.

[0012] In this example, the following procedures perform processing between data transfer units.
(1) Data transfer unit 103 Destination terminal 112 Connection is recognized.
(2) Data transfer unit 103 The main conversion means 11 is the destination terminal 112. It is the address 1.1.3.100 about the address 1.1.2.100. It will change.
(3) Data transfer unit 103 The main conversion means 11 is the transmitting agency address 1.1.2.100. It is the transmitting agency address of data 1.1.3.100 Destination address 1.1.3.100 It is the destination address of data 1.1.2.100 Conversion is started.
(4) data transfer unit 103 from — transmitting agency terminal 111 the connected data transfer unit 101 — receiving — the address 1.1.2.100 The address 1.1.3.100 Conversion information that it changes is notified.
(5) data transfer unit 101 Data transfer unit 103 from — conversion information — the conversion information receiving means 13 — receiving — the ****** means 14 — the transmitting agency address 1.1.3.100 the transmitting agency address of the data which arrived — 1.1.2.100 changing — destination address 1.1.2.100 the destination address of data which arrived — 1.1.3.100 Conversion is started.
[0013] It sets for the above procedure and is a procedure (3). Procedure (4) It is good also as after. Moreover, the notice in the above procedure may be added to terminal data, and may be transmitted.
[0014] Next, the example of the address translation after initiation of processing between this data transfer unit is shown.
(1) Data transfer unit 103 It goes and is the destination terminal 112. Transmitting agency terminal 111 Transmitting agency address 1.1.2.100 The given data are sent out.
(2) Data transfer unit 103 It is the transmitting agency address 1.1.2.100 given to the data 1.1.3.100 Address translation is carried out and data are transmitted to the router network 20. Data go via the router network 20 and are a data transfer unit 101. It arrives.
(3) data transfer unit 101 Destination terminal 112 from — the sent transmitting agency address 1.1.3.100 the transmitting agency address of the given data — 1.1.2.100 returning — data — transmitting agency terminal 111 It transmits.
(4) transmitting agency terminal 111 Destination terminal 112 from — the transmitting agency address 1.1.2.100 which shows that it is information The given data are received.
[0015] (5) It is the transmitting agency terminal 111 conversely. Destination terminal 112 Address 1.1.2.100 It considers as a destination address and data are sent out.
(6) destination address 1.1.2.100 the given data — data transfer unit 101 arriving — data transfer unit 101 address translation — a destination address — 1.1.2.100 from — 1.1.3.100 It is changed.
(7) Destination address 1.1.3.100 Data transfer unit 103 It is a destination address 1.1.3.100, without rewriting routing table anew, since it is beforehand recognized by each router of the router network 20 that it is the address of the terminal to connect. The given data go via the router network 20, and are a data transfer unit 103. It is gone and transmitted.
(8) Destination address 1.1.3.100 The given data are a data transfer unit 103. It arrives and a destination address is 1.1.2.100 by address translation. It is changed. The data after conversion are a destination address 1.1.2.100. Destination terminal 112 It is transmitted.
[0016] Procedure (6) It sets and is a data transfer unit 101. Although only the data which carried out address translation are transmitted, it may be desirable to transmit both with the data which carried out address translation and which do not carry out data and address conversion. For example, it is the communication link of the cellular phone of IMT-2000 which performs a multi-pass communication link etc. However, since the amount of data which a data transfer unit transmits according to the count which changed connection increases when a terminal changes connection one after another among many data transfer units, when there is no connection, the processing which suspends the transfer to the data transfer unit which is the former destination is needed [the data transfer unit which is the former destination notifies an initial entry with a destination terminal, and]. Moreover, although only the destination terminal changed the data transfer unit to connect in this example, it is also the same as when a transmitting agency terminal carries out address translation.

[0017] Moreover, the terminal other than the address which the ****** means indicated to the conversion information which the main conversion means shows concretely may change into the address addressed to the destination terminal the address of the data which make the terminal the destination by the multicast address in the case of belonging to the multicast group, or the broadcast address related to a terminal. Moreover, in connection with address translation, the re-calculation of the header checksum of IP header, TCP, and an UDP false header or the re-calculation of the TCP sequence number in FTP (file transfer protocol) may be performed.

[0018] As mentioned above, the processing which makes unnecessary routing-table rewriting processing of the router which exists in address re-acquisition processing of a terminal or a transfer path, and is require of a network and a terminal mitigates, quick processing enables, and degradation of the overload of the router accompanying frequent path modification and the communication link quality by root damping, the blocking of a communication link, etc. protect, without cause huge-ization of a packet by cooperate between data transfer units and perform address translation in this example.

[0019] [the 2nd example] — the condition of having started the communication link in the 1st example of the above — destination terminal 112 the address — data transfer unit 102 from — although given — this example — destination terminal 112 It shall have the address of a proper. In this example, the following procedures perform processing between data transfer units. At an initial state, it is the destination terminal 112. It is the address 192.1.1.100 It carries out.

(1) Data transfer unit 102 Destination terminal 112 Connection is recognized.

(2) It is the destination terminal 112, without rewriting the routing table of the router network 20. In order to receive the data of addressing, it is a data transfer unit 102. Destination terminal 112 192.1.1.100 which is the address 1.1.2.100 which is the address with which self manages and data are transmitted to self-addressed Address translation is carried out and data communication is started. The following procedures are the same as the 1st example of the above.

[0020] As mentioned above, in this example, when the terminal has the address of a proper, a terminal can communicate, without being dependent on the address of the transfer equipment to connect with the address of a proper.

[0021] The [3rd example] Although the transmitting agency terminal communicated in the 2nd example of the above, without getting to know the true address of a destination terminal, in this example, a transmitting agency terminal can recognize the address of the proper of a destination terminal. In this example, the following procedures perform processing between data transfer units. At an initial state, it is the destination terminal 112. It is the address 192.1.1.100 It carries out.

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(3) Data transfer unit 102 Data transfer unit 101 It receives and is the address 1.1.2.100. The data of addressing are the address 192.1.1.100. It notifies that it is data of addressing and is the transmitting agency terminal 111. Address 192.1.1.100 It is the address 1.1.2.100 about the data of addressing. Address translation is required as becoming addressing and data communication is started. The following procedures are the same as the 2nd example of the above.

[0022] As mentioned above, in this example, a terminal can communicate between terminals with the address of a proper, without depending to the address of the data transfer unit connected with the address of a proper.

[0023]
[Effect of the Invention] As explained above, even if the data transfer unit to connect changes according to the data transfer unit of this invention, by cooperating between data transfer units and performing address translation, routing table rewriting processing of all the routers belonging to the router or router network with which address re-acquisition processing of a terminal or a transfer path exists is made unnecessary, the processing required of a data transfer network and a terminal is mitigated, and quick processing is enabled.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is drawing showing the outline of the data transfer system by the mobile terminal.
[Drawing 2] It is drawing showing the configuration of the 1st example of the data transfer unit by this invention.
[Drawing 3] It is drawing explaining actuation of the data transfer unit by this invention.
[Drawing 4] It is drawing explaining actuation of the data transfer unit by this invention.
[Description of Notations]
1 Transmitting Agency Terminal
2, 3, 4 Router
5 Six Destination terminal
7 IP Tunneling
10,101,102,103 Data transfer unit
11 The Main Conversion Means
12 Notice Means
13 Conversion Information Receiving Means
14 ****** Means
15 Transfer Means
20 Router Network
111 Transmitting Agency Terminal
112 Destination Terminal
122 123 The transfer range of a data transfer unit

[Translation done.]

| (51)Int.Cl.⁷	識別記号	FI		テーマコード(参考)
H04L　12/56		H04L　11/20	102D	5K030
12/66			B	5K034
29/06		13/00	305A	9A001

審査請求　未請求　請求項の数1　OL　（全 8 頁）

最終頁に続く

(54)【発明の名称】　データ転送装置

(57)【要約】

【課題】　端末アドレスの再取得処理を不要にし、ルータのルーティングテーブルの書換え処理を不要にし、迅速に接続処理を行うことができるデータ転送装置を提供する。

【解決手段】　1又は複数のIPアドレスを管理し、接続する端末の送信元IPアドレスを前記管理するアドレスに変換する主変換手段、主変換手段によりアドレスを変換した変換情報を他のデータ転送装置に対して通知する通知手段、他のデータ転送装置から通知された変換情報を受信する変換情報受信手段、変換情報受信手段が受信した変換情報に記載されたアドレスを有するデータのアドレスを前記変換情報に従って変換する従変換手段、及び、主変換手段及び従変換手段を経由したデータを転送する転送手段を具える。
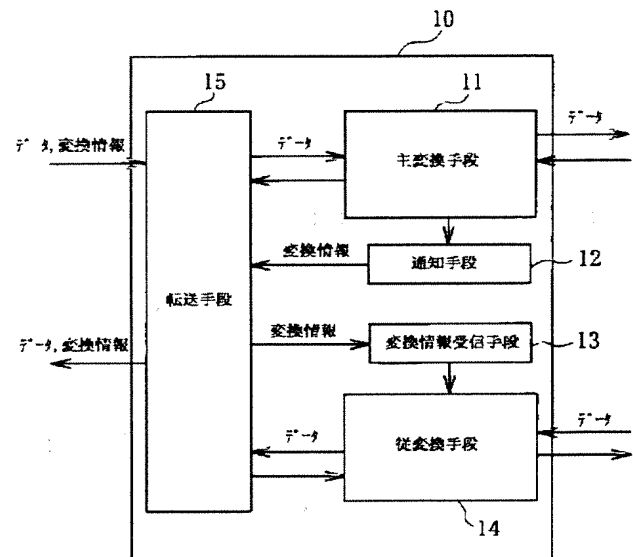
【特許請求の範囲】
【請求項1】　１又は複数のＩＰアドレスを管理し、接続する端末の送信元ＩＰアドレスを前記管理するアドレスに変換する主変換手段、該主変換手段によりアドレスを変換した変換情報を他のデータ転送装置に対して通知する通知手段、他のデータ転送装置から通知された変換情報を受信する変換情報受信手段、該変換情報受信手段が受信した変換情報に記載されたアドレスを有するデータのアドレスを前記変換情報に従って変換する従変換手段、及び、前記主変換手段及び従変換手段を経由したデータを転送する転送手段を具えることを特徴とするデータ転送装置。

【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、データを転送するデータ転送装置、特にＩＰ（インターネットプロトコル）アドレスを有する移動体端末のデータを転送するためにルータ網に接続するデータ転送装置に関する。

【０００２】
【従来の技術】従来、ＩＰ端末が一つのルータの管理する管理サブネット又はアクセスポイントのゾーンから他のルータの管理する管理サブネット又は他のアクセスポイントのゾーンに移動する際の動作として以下の三つの方式がある。

【０００３】第一の方式は、端末が、接続するルータ毎に個別のＩＰアドレスを持つ方式である。この方式では、端末が新たにルータに接続する際には対応するＩＰアドレスを再度取得する必要がある。このＩＰアドレス再取得の手続きは、煩雑且つ長い処理時間を要するために、ＩＰ端末並びにＩＰ端末に対してＩＰアドレスを発行するルータ及び途中の経路にあるルータの処理能力の低下が生じ、更に一つのゾーンから他のゾーンに又は一つのルータの管理サブネットから他のルータのサブネットにハンドオーバを行う際の再接続処理のために一時的に通信の途絶を生じる可能性がある。また、移動速度が速く且つ広帯域の携帯ＩＰ端末が出現した場合、頻繁なゾーン間の移動又はルータの管理サブネット間の移動により、より頻繁なハンドオーバが行われることになり、そのための再取得処理がＩＰ端末間の通信のネックとなることが予想される。

【０００４】第二の方式は、ＩＰ端末が固有のＩＰアドレスを保持し続け、接続変更に伴い、端末間の転送経路に位置する全てのルータ又はルータ網に属する全てのルータが、データを転送するために用いるルーティングテーブルを書換える方式である。この方式においても、通常、テーブル書換えの頻度は分のオーダーであるため、書換えによりハンドオーバーが実施されてから通信が再開されるまでの時間が無視できないものになるという問題がある。更に、テーブル書換えの頻度が甚だしい場合、ルータ過負荷によるルータ処理速度の低下、又は書換えを一定時間抑制するルートダンピングによる通信途絶が起きる可能性がある。

【０００５】第三の方式は、ＩＰトンネリングを用いる方式である。ＩＰトンネリングとは、例えばInternet Engineering Task Force のRequest For Comments（IETF RFC）2003に記載されているように、元のＩＰパケットに所定のＩＰヘッダを付加し、元のＩＰパケットを新しいＩＰパケットのデータ部としてカプセル化する方法である。ＩＰトンネリングを用いる場合、ＩＰパケットをＩＰ端末が属するホームルータからＩＰ端末の移動先のルータに対してデータを転送する際に、新しく接続するルータに転送するためのアドレスを記載したＩＰヘッダを元のＩＰパケットの外側に付加する。この方式では、このように、ＩＰパケットの外側に更にＩＰヘッダを付けることになるので、その分の帯域が無駄に費やされるという問題がある。また、図１に示すように、ルータ２の管理サブネット内にある送信元端末１と接続している宛先端末５が、ルータ３の管理サブネット内からルータ４の管理サブネット内の宛先端末６の位置に移動した場合、ルータ３とルータ４との間でＩＰトンネリング７が実施される。その場合、情報は一旦ルータ３に到着した後、カプセル化してルータ４に転送されるため、ルータ２とルータ３との間で往復で無駄なデータが転送されることになり、そのため帯域を圧迫し、他の装置と共有する通信帯域の低下につながるという問題がある。また、ＩＰカプセル化によるパケットの長大化により、ネットワーク上でのパケットの最大長の制限を超えることもある。その場合、パケット転送の中止又は複数のパケットに分割してパケット長を短くするフラグメント化処理を行うが、この処理によりルータの負荷が増大するという問題もある。

【０００６】
【発明が解決しようとする課題】本発明の目的は、上述の問題点に鑑み、端末アドレスの再取得処理を不要にし、ルータのルーティングテーブルの書換え処理を不要にし、迅速に接続処理を行うことができるデータ転送装置を提供することにある。

【０００７】
【課題を解決するための手段】本発明のデータ転送装置は、上記の目的を達成するため、１又は複数のＩＰアドレスを管理し、接続する端末の送信元ＩＰアドレスを前記管理するアドレスに変換する主変換手段、主変換手段によりアドレスを変換した変換情報を他のデータ転送装置に対して通知する通知手段、他のデータ転送装置から通知された変換情報を受信する変換情報受信手段、変換情報受信手段が受信した変換情報に記載されたアドレスを有するデータのアドレスを変換情報に従って変換する従変換手段、及び、主変換手段及び従変換手段を経由したデータを転送する転送手段を具えることを特徴とする。

【０００８】本発明によれば、データ転送装置相互間で協調したアドレス変換を行うため、端末アドレスの再取得処理及びルータのルーティングテーブルの書換え処理が不要になる。

【０００９】

【発明の実施の形態】次に本発明の実施例を説明する。

【００１０】〔第１実施例〕図２は本発明によるデータ転送装置の第１実施例の構成を示す図である。この実施例においては、データ転送装置10は、１又は複数のＩＰアドレスを管理し、接続する端末の送信元ＩＰアドレスを管理するアドレスに変換する主変換手段11、主変換手段11によりアドレスを変換した変換情報を他のデータ転送装置に対して通知する通知手段12、他のデータ転送装置から通知された変換情報を受信する変換情報受信手段13、変換情報受信手段13が受信した変換情報に記載されたアドレスを有するデータのアドレスを変換情報に従って変換する従変換手段14、及び、主変換手段11及び従変換手段14を経由したデータを転送する転送手段15を具える。

【００１１】次に、図３及び４を用いて第１実施例の動作を説明する。ここでは、各データ転送装置101、102、103が自己転送範囲内にある端末に対しそれぞれ付与できるＩＰアドレス1.1.1.X、1.1.2.X、1.1.3.Xを管理し、且つ各データ転送装置101、102、103が接続するルータ網20には、或る特定のデータ転送装置が管理するアドレスのデータはその特定のデータ転送装置に転送するように、ルーティングテーブルが既に構築されているものとする。Ｘは０から255までの任意の値を表すものとする。即ち、データ転送装置のサブネットは24ビットマスクとする。宛先端末112は、アドレス1.1.2.1のデータ転送装置102と接続しており、データ転送装置102が管理するアドレス1.1.2.100を付与されているものとする。ここで、宛先端末112が、図４に示すように、データ転送装置102の転送範囲122からアドレス1.1.3.1のデータ転送装置103の転送範囲123に移動するものとする。

【００１２】この実施例においては、以下の手順でデータ転送装置間の処理を行う。

(1) データ転送装置103が宛先端末112の接続を認識する。

(2) データ転送装置103の主変換手段11が、宛先端末112のアドレス1.1.2.100をアドレス1.1.3.100に変換することにする。

(3) データ転送装置103の主変換手段11が、送信元アドレス1.1.2.100のデータの送信元アドレスを1.1.3.100に、宛先アドレス1.1.3.100のデータの宛先アドレスを1.1.2.100に、変換を開始する。

(4) データ転送装置103から送信元端末111が接続しているデータ転送装置101に対して、アドレス1.1.2.100をアドレス1.1.3.100に変換するとの変換情報を通知する。

(5) データ転送装置101が、データ転送装置103からの変換情報を変換情報受信手段13で受信し、従変換手段14により、送信元アドレス1.1.3.100で到着したデータの送信元アドレスを1.1.2.100に変換し、宛先アドレス1.1.2.100で到着したデータの宛先アドレスを1.1.3.100に、変換を開始する。

【００１３】以上の手順において、手順(3)は手順(4)の後としてもよい。また、以上の手順における通知は、端末データに付加して転送してもよい。

【００１４】次に、このデータ転送装置間での処理の開始後におけるアドレス変換の例を示す。

(1) データ転送装置103を経由し、宛先端末112が、送信元端末111に送信元アドレス1.1.2.100を付与したデータを送出する。

(2) データ転送装置103が、そのデータに付与された送信元アドレス1.1.2.100を1.1.3.100にアドレス変換してデータをルータ網20に転送する。データはルータ網20を経由してデータ転送装置101に到着する。

(3) データ転送装置101が、宛先端末112から送付された送信元アドレス1.1.3.100が付与されたデータの送信元アドレスを1.1.2.100に戻し、データを送信元端末111に転送する。

(4) 送信元端末111が、宛先端末112からの情報であることを示す送信元アドレス1.1.2.100が付与されたデータを受取る。

【００１５】(5) 逆に、送信元端末111が、宛先端末112のアドレス1.1.2.100を宛先アドレスとしてデータを送出する。

(6) 宛先アドレス1.1.2.100が付与されたデータがデータ転送装置101に到着し、データ転送装置101でのアドレス変換により、宛先アドレスが1.1.2.100から1.1.3.100に変換される。

(7) 宛先アドレス1.1.3.100はデータ転送装置103に接続する端末のアドレスであることがルータ網20の各ルータには予め認識されているので、改めてルーティングテーブルを書換えることなく、宛先アドレス1.1.3.100を付与されたデータはルータ網20を経由してデータ転送装置103に向かって転送される。

(8) 宛先アドレス1.1.3.100を付与されたデータは、データ転送装置103に到着し、アドレス変換により、宛先アドレスが1.1.2.100に変換される。変換後のデータは、宛先アドレス1.1.2.100の宛先端末112に転送される。

【００１６】手順(6)において、データ転送装置101はアドレス変換したデータのみを送信しているが、アドレス変換したデータとアドレス変換しないデータとの両者を転送することが望ましい場合もある。例えば、マルチパス通信を行うＩＭＴ-2000の携帯電話の通信等である。但し、端末が多数のデータ転送装置の間で次々と接

続を変える場合は、接続を変えた回数に応じてデータ転送装置が転送するデータ量が増えるため、以前の転送先であるデータ転送装置が宛先端末との接続情報を通知し、接続がない場合は以前の転送先であるデータ転送装置に対する転送を停止する処理が必要になる。また、この実施例では、接続するデータ転送装置を宛先端末のみが変換したが、送信元端末がアドレス変換する場合も同様である。

【0017】また、従変換手段が、主変換手段が具体的に示す変換情報に記載したアドレスの他に、端末がマルチキャストグループに所属している場合のマルチキャストアドレス又は端末が関係するブロードキャストアドレス等で、その端末を宛先とするデータのアドレスをその宛先端末宛のアドレスに変換してもよい。また、アドレス変換に伴い、IPヘッダ、TCP及びUDP擬似ヘッダのヘッダチェックサムの再計算、又はFTP（ファイル転送プロトコル）でのTCPシーケンス番号の再計算等を行ってもよい。

【0018】以上のように、この実施例においては、データ転送装置間で協調してアドレス変換を行うことにより、パケットの長大化を招くことなく、端末のアドレス再取得処理又は転送経路に存在するルータのルーティングテーブル書換え処理を不要にし、且つネットワーク及び端末に要求される処理を軽減し、迅速な処理を可能とし、頻繁な経路変更に伴うルータの過負荷、ルートダンピングによる通信品質の劣化又は通信の途絶等を防ぐ。

【0019】〔第2実施例〕上記第1実施例では、通信を開始した状態で宛先端末112がアドレスをデータ転送装置102から付与されたが、この実施例では、宛先端末112が固有のアドレスを持っているものとする。この実施例においては、以下の手順でデータ転送装置間の処理を行う。初期状態では、宛先端末112のアドレスを192.1.1.100とする。

（1）データ転送装置102が宛先端末112の接続を認識する。

（2）ルータ網20のルーティングテーブルを書換えることなく、宛先端末112宛のデータを受取るために、データ転送装置102が、宛先端末112のアドレスである192.1.1.100を、自己が管理し自己宛にデータが転送されるアドレスである1.1.2.100にアドレス変換してデータ通信を開始する。以下の手順は上記第1実施例と同じである。

【0020】以上のように、この実施例においては、端末が固有のアドレスを持っている場合、端末は固有のアドレスのままで、接続する転送装置のアドレスに依存せずに通信を行うことができる。

【0021】〔第3実施例〕上記第2実施例では、送信元端末は宛先端末の真のアドレスを知ることなしに通信したが、この実施例においては、宛先端末の固有のアドレスを送信元端末が認識できる。この実施例において

は、以下の手順でデータ転送装置間の処理を行う。初期状態では、宛先端末112のアドレスを192.1.1.100とする。

（1）データ転送装置102が宛先端末112の接続を認識する。

（2）ルータ網20のルーティングテーブルを書換えることなく、宛先端末112宛のデータをデータ転送装置102を介して受取るために、データ転送装置102が宛先端末112宛のデータのアドレスを192.1.1.100から1.1.2.100にアドレス変換する。

（3）データ転送装置102がデータ転送装置101に対して、アドレス1.1.2.100宛のデータはアドレス192.1.1.100宛のデータであることを通知し、送信元端末111がアドレス192.1.1.100宛のデータをアドレス1.1.2.100宛になるようにアドレス変換を要求し、データ通信を開始する。以下の手順は上記第2実施例と同じである。

【0022】以上のように、この実施例においては、固有のアドレスを持っている端末間において、端末は固有のアドレスのままで、接続するデータ転送装置のアドレスに依存せずに通信を行うことができる。

【0023】

【発明の効果】以上説明したように、本発明のデータ転送装置によれば、接続するデータ転送装置が変わっても、データ転送装置間で協調してアドレス変換を行うことにより、端末のアドレス再取得処理又は転送経路が存在するルータ又はルータ網に属する全ルータのルーティングテーブル書換え処理を不要にし、データ転送網及び端末に要求される処理を軽減し、迅速な処理を可能にする。

【図面の簡単な説明】

【図1】 移動体端末によるデータ転送システムの概略を示す図である。

【図2】 本発明によるデータ転送装置の第1実施例の構成を示す図である。

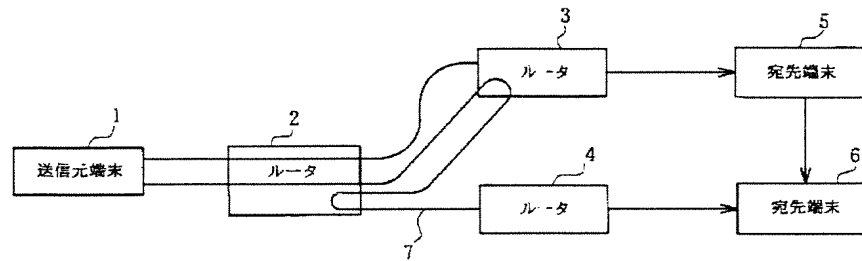【図3】 本発明によるデータ転送装置の動作を説明する図である。

【図4】 本発明によるデータ転送装置の動作を説明する図である。

【符号の説明】

1 送信元端末

2、3、4 ルータ

5、6 宛先端末

7 IPトンネリング

10、101、102、103 データ転送装置

11 主変換手段

12 通知手段

13 変換情報受信手段

14 従変換手段

15 転送手段

20 ルータ網

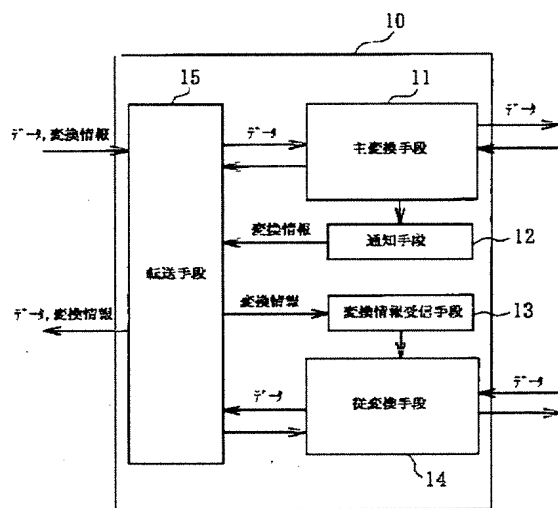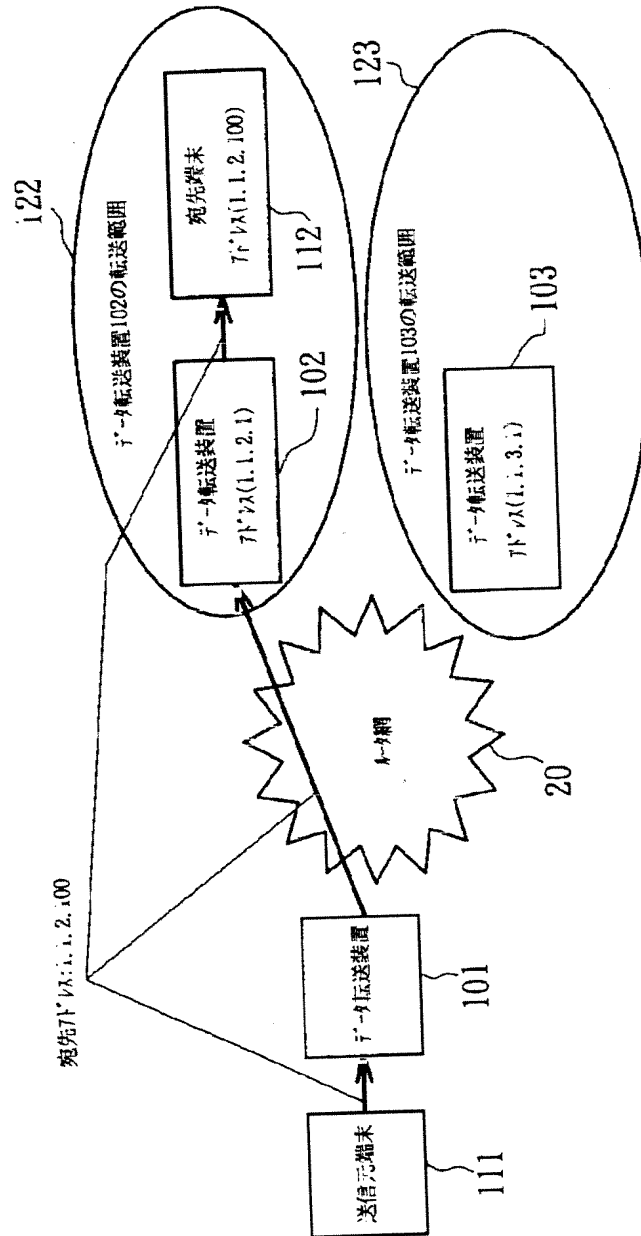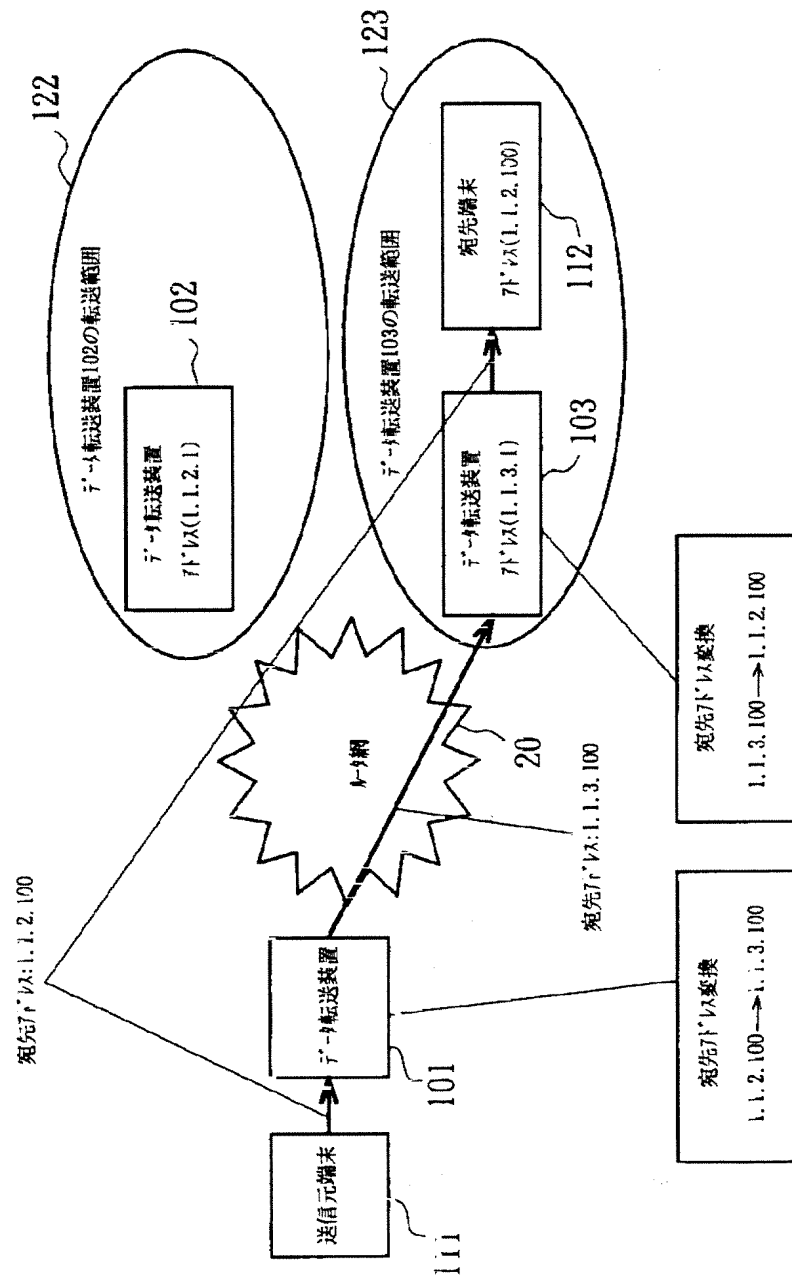111　送信元端末　　　　　　　　　　　　　122、123　データ転送装置の転送範囲
112　宛先端末

【図1】

【図2】

【図3】

【図4】

Ｆターム(参考)　5K030 GA02 GA13 HA04 HC09 HD01
　　　　　　　　　　　HD09 JA07 JL01 JT09 LB09
　　　　　　　　　　　LC06 MA15 MB03
　　　　　　　　5K034 AA02 AA17 DD01 FF08 HH06
　　　　　　　　　　　HH63 MM39 NN11 NN31 SS03
　　　　　　　　9A001 BB04 CC06 DD10 EE02 JJ18
　　　　　　　　　　　JJ25 KK56